PERIODICAL ROOM
GENERAL LIBRARY
OCT 13 1930

The JOURNAL of GEOGRAPHY

VOLUME XXIX OCTOBER-1930 NUMBER 7

In This Issue

The Mountain Communities of the Boulder Region, Colorado . . . . . *Ralph H. Brown*

The Great Karroo of South Africa . . . . . *Lynn H. Halverson*

The Use of the Excursion in Teaching Commercial Geography . *C. C. Crawford and Roland W. Grinstead*

A Sixth Grade Project on Tin . . . . . *Virginia Willcuts*

Editorial Notes and News . . . . . .

Geographical Publications . . . . . .

Published by A. J. NYSTROM & CO., for THE NATIONAL COUNCIL OF GEOGRAPHY TEACHERS
GEORGE J. MILLER, *Editor*

The JOURNAL *of* GEOGRAPHY

A MAGAZINE FOR SCHOOLS

GEORGE J. MILLER, *Editor*

CORA P. SLETTEN, *Assistant Editor*

State Teachers College, Mankato, Minn.

Associate Editors

R. H. WHITBECK, University of Wisconsin, Madison

R. M. BROWN, Rhode Island College of Education, Providence

E. E. LACKEY, University of Nebraska, Lincoln

ERNA GRASSMUCK, State Teachers College, Indiana, Pa.

A. E. PARKINS, George Peabody College for Teachers, Nashville, Tennessee

D. C. RIDGLEY, Clark University, Worcester, Mass.

SUBSCRIPTION TERMS

The subscription price is $2.50 a year, payable in advance. The price of single copies is 35 cents. Postage is prepaid on subscriptions from the United States, Canal Zone, Republic of Panama, Porto Rico, Cuba, Virgin Islands of the United States, Dominican Republic, Philippines, Guam, Samoan Islands, Hawaii, Mexico, Costa Rica, Guatemala, Nicaragua, Republic of Honduras, Salvador, Argentina, Bolivia, Brazil, Colombia, Ecuador, Paraguay, Peru, Uraguay, Spain and Spanish Colonies. Postage is charged extra for Canada and all other countries in the Postal Union as follows: 27 cents on annual subscriptions (total $2.77), on single copies 3 cents (total 38 cents).

The Journal is the official organ of the National Council of Geography Teachers and is sent to all members of the organization. The anunal dues, $2.00, are payable to the *Journal of Geography*. Extra postage rates for copies sent to foreign countries should be added to the membership dues.

Patrons are requested to make all remittances payable to the *Journal of Geography*, in postal or express money orders or bank drafts.

Members and subscribers who wish to continue receiving the *Journal* must send remittances promptly to assure the volume being complete.

Send manuscript and books for notice or review to the *Editor*.
Send orders for back numbers to *Journal of Geography*.

Published monthly except June, July and August

PUBLICATION OFFICES: 450-454 AHNAIP STREET, MENASHA, WISCONSIN

Business Correspondence, Membership Dues, and Subscriptions may be sent to Publication office or to

A. J. NYSTROM AND COMPANY
PUBLISHERS, JOURNAL OF GEOGRAPHY
3333 ELSTON AVENUE, CHICAGO

Entered as second-class matter January 15, 1919, at the postoffice of Menasha, Wisconsin, under the Act of March 3, 1879.

THE JOURNAL OF GEOGRAPHY

CONTENTS FOR OCTOBER, 1930

The Mountain Communities of the Boulder Region, Colorado. By Ralph H. Brown 271

Dr. Brown is now on the staff of the University of Minnesota and was formerly at the University of Colorado. He has taken Rocky Mountain geography as his special field of study. In October, 1927, he presented A Method of Teaching Regional Geography in the JOURNAL, and in January, 1925, an article on Muscle Shoals.

This is the sixth article in our series of experimental writings in geography. Readers not familiar with this series should refer to the JOURNAL for January, 1930. The next articles will be by Dr. Preston E. James, The Shari Plain, and by Professor R. H. Whitbeck, The Sugar Industry of Porto Rico.

The Great Karroo of South Africa. By Lynn H. Halverson 287

Dr. Halverson is head of the department of geography, State Teachers College, Marquette, Michigan, and author of Geography in Teachers Colleges, in *Education*, December, 1928; Some Problems in the Teaching of Physiography in the High School, in *School Science and Mathematics*, June, 1925; Geography in the Joliet Township High School, and Pictures in the Teaching of Geography, in the JOURNAL OF GEOGRAPHY, October, 1928, and December, 1929, respectively.

The Use of the Excursion in Teaching Commercial Geography. By C. C. Crawford and Roland W. Grinstead 301

Dr. Crawford is a professor of education, University of Southern California, and author of numerous books in education, a recent one being Modern Methods in Teaching Geography. Mr. Grinstead is instructor in social science, Washington Junior High School, Pasadena, California, and formerly a superintendent of schools in Idaho.

A Sixth Grade Project on Tin. By Virginia Willcuts 306

Miss Willcuts is supervisor of the third and fourth grades in the Training Department, State Teachers College, Duluth, Minnesota. The project presented here was carried out under her direction.

Editorial Notes and News 311

Geographical Publications 313

Contents of the JOURNAL are indexed regularly in the *Educational Index to Periodicals.*

Authors alone are responsible for opinions and statements in the JOURNAL.

In Treating the Countries of the World

BRIGHAM and McFARLANE'S ESSENTIALS of GEOGRAPHY

Describe and Depict their Important Physical, Economic, Industrial and Commercial Features

With much valuable information relating to their Government, History, Travel and Transportation, Climate, Life and Peoples, Products, etc., etc.

AMERICAN BOOK COMPANY

New York Cincinnati Chicago Boston Atlanta

The JOURNAL *of* GEOGRAPHY

Copyright, 1930, The Journal of Geography

VOLUME XXIX OCTOBER, 1930 NUMBER 7

THE MOUNTAIN COMMUNITIES OF THE BOULDER REGION, COLORADO

RALPH H. BROWN
University of Minnesota

The city of Boulder, as a quality of its site astride the Middle (Main) Boulder Creek at its canyon-like exit from the adjacent foothills of the Front Range of the Rocky Mountains, presents within its immediate compass natural conditions of remarkable diversity. In this respect the city is unique among the several urban centers of the piedmont of northern Colorado, with which it is commonly, and from many standpoints quite appropriately, grouped (Fig. 1). Altho to the south noteworthy urban centers have similar sites marginal to the plains and the mountains (Canyon City for example), in the northern piedmont, communities other than Boulder occupying such sites are all of inferior size (Golden and Lyons for instance). Cities of the northern Colorado piedmont more distant from the mountains than Boulder have, to be sure, varied and fundamental interests in the mountain environment, as is reflected in their dependence upon water, the maintenance of city mountain park systems, and doubtless in other interests not so obvious. Such activities and interests do not, however, reproduce for the other piedmont cities the intimacy of contact with the mountains which Boulder gains by its adjacency to them.

THE ADJACENT MOUNTAINS AN INTEGRAL PART OF THE BOULDER REGION

Boulder has significant mountainward interests because of its commanding position at the mountain portals of the Main Boulder Creek which has been since the local gold discoveries of 1859 the

recognized entrance to and exit from an occupied region peculiarly dependent upon contacts with the plains. This dependence originally resulted on the one hand from the limitations of the environment itself and on the other from the necessity of marketing in various forms the output of the mines which so quickly followed in the wake of gold prospecting, an activity in full vigor here by 1860.

The nucleus of the present city was thus coincident with the stirring times which immediately followed the dramatic discovery of free gold on Gold Hill, an event inevitably resulting in rapid human occupancy of the surrounding mountain country.[1] Since that

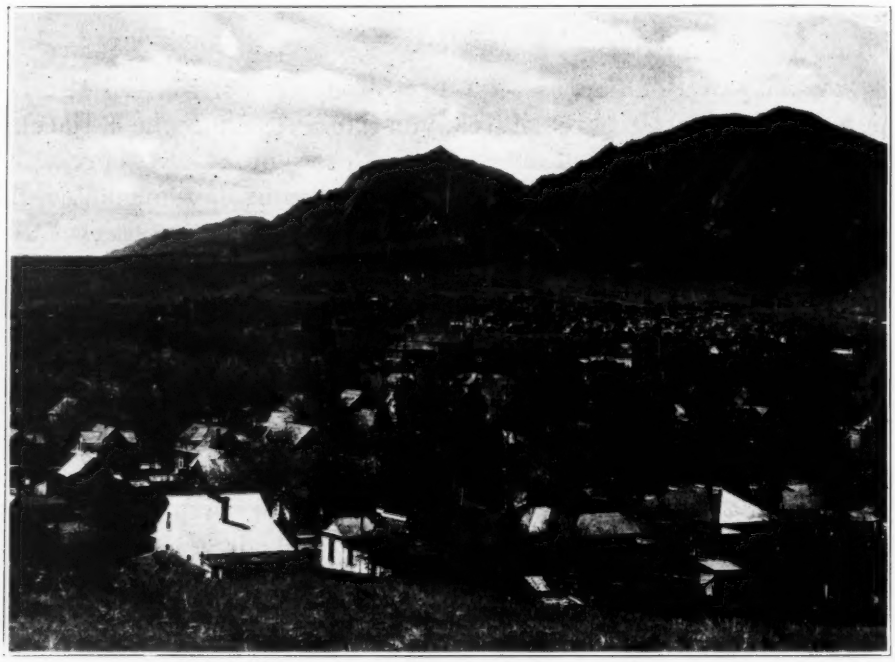

FIG. 1. The site of Boulder, Colo. The city is located in the middle distance, extending on either side of Middle Boulder Creek.

[1] "Charles Clouser and party pushed back from the foothills up what is now known as Sunshine Canyon, following the main ridge between Four Mile and Left Hand Canyon, until they camped . . . on the west slope of Gold Hill, December, 1858. Here they found good values in the head of the gulch they afterward named Gold Run. The word that gold had been found in paying quantities spread very quickly, and claim after claim was located upon the gulch. A ditch 6 or 7 miles long was built to bring water from Left Hand Creek to the head of Gold Run, and during the next three or four years about $100,000 gold was produced." Quotation in Mining in Colorado, Professional Paper 138, U.S.G.S., p. 105

time Boulder has consistently maintained the local preëminence that the needs of this period gave to it, despite the general and everywhere apparent retrenchment of the very industry (metal-mining) which gave the city birth.

MOUNTAINWARD INTERESTS OF THE CITY HIGHLY LOCALIZED

The part of the adjacent mountains of interest in this study includes the eighteen communities distributed in the main and tributary valleys of the Middle Boulder and Left Hand Creeks. Beyond these villages, all of which are within twenty miles of Boulder, the mountainward interests of the city clearly diminish. But not

FIG. 2. A section of the Front Range, forming the continental divide, west of the city. View was taken in August.

entirely, as is evidenced by the firm control exerted by the city over the glacier-fed lakes of the Arapahoe Valley, under the continental divide, from which its domestic water is secured.

Clearly, the city gains but little material advantage from its general site as a piedmont city, inasmuch as trans-mountain routes do not focus upon it. This is illustrated by the fact that the highway along the Main Boulder, despite improvements quite in step with those in other parts of the mountains, does not rank as one of the state's trans-mountain highways. This is largely a measure of the effectiveness as a barrier of the section of the continental divide directly west of the city (Fig. 2). Arapahoe Pass, which ultimately became useful for wagon traffic, has been in disuse for commercial purposes for years, while the original Boulder Pass,

now Rollins Pass (recently avoided for railroad purposes by the construction near it of the Moffat Tunnel) is naturally approachable by South Boulder Creek and not directly by the Main Boulder. It is true that the chief trans-mountain and also trans-continental highway of the state which negotiates the range thru Berthoud Pass, is easily approachable by way of the Main Boulder to Central City and Idaho Springs, thus giving to the city indirect trans-mountain connections; and that considerable traffic destined for Estes Park and across the divide to Grand Lake by Fall River and Milner Passes, proceeds thru Boulder to Ward or Nederland; but these are distinctly not commercial uses.[2] The narrow-gauge railroad (Boulder, Denver and Western) which was dismantled in 1918 after years of declining traffic following the peak of mineral production in 1892, was exclusively a local railroad connecting the original mining camps with the trunk lines at Boulder.[3] These circumstances emphasize the chief character of Boulder as the portal of its immediate mountains and not the trading mart of a mountain region of vast and indefinite area as is possibly true of some piedmont cities.

The area to be considered is thus roughly fan-shaped with the handle of the fan pointing eastward to the city of Boulder. The southern limits of the region coincide with the sharp divide between the Main and South Boulder Creeks which is also approximated by the county boundary. The relatively unoccupied region tributary to the South St. Vrain Creek forms the northern limit. Into this region is compressed the larger part of the small resident population, metallic mineral production, and consequently the majority of the cultural forms of the mountains of Boulder County (Fig. 3).

A Mountainous Region of Negligible Agriculture

It is the presence of these distinguishing cultural forms in the landscape which separate this mountain region here considered from the contiguous portions of the Front Range, inasmuch as the region presents few natural landscape features not to be found in other portions of the mountains.

Characteristic of this range, the local marginal mountain forms

[2] Ralph H. Brown, Colorado Mountain Passes, The *Colorado Magazine*, State Historical Society of Colorado, Vol. 6, 1929, p. 235

[3] Philip G. Worcester, Geology of the Ward Region, Boulder County, Colorado. Colorado Geological Survey, Bull. 21, 1920, p. 16

THE BOULDER MOUNTAIN REGION
COLORADO
Scale:
LEGEND
Areas of circles proportional to census residences
Ten
Seventy-five
Boosting some retail trade
Individual mines periodically active during last decade
Gold-silver
Gold-silver with some tungsten
Tungsten only
Fluorspar only
Main highways
Less important highways
(Roads not indicated)
N
CITY OF BOULDER
JAMESTOWN
WARD
SUNSET
WALLSTREET
MAGNOLIA
TUNGSTEN
NEDERLAND
CARIBOU
CARDINAL
LODORA
CONTINENTAL DIVIDE
GRAND CO.
BOULDER CO.
BOULDER CO.
GILPIN CO.

FIG. 3.

are distinctly linear (north-south), the result of the opening of broad inter-ridge valleys in the up-turned plains sediments, a feature especially noticeable in the mountain entrance of the road following Left Hand Creek. For the first mile or so this road follows the broad, open (strike) valley nearly north and south. Immediately beyond these abrupt and conspicuous linear features, the more complex mountain forms appear, the main streams occupying narrow, because youthful, canyon-like valleys of one thousand to fifteen hundred feet declivity. Canyons of such depth, which

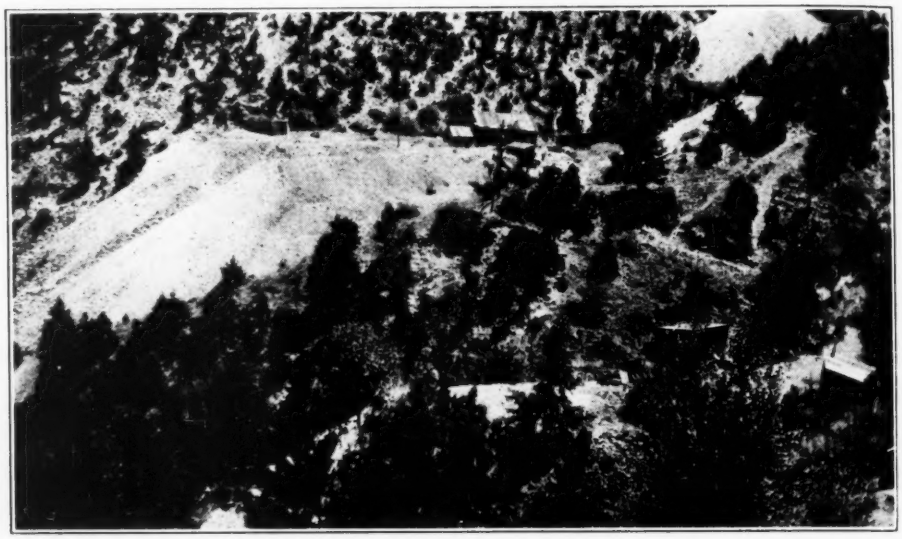

FIG. 4. Looking southward across the Sunbeam Gulch, near Crisman, to the mine dump of the Yellow Pine Mine, one of the largest producers in the Boulder Region. Production has been small since the drop in the price of silver in 1922, silver being the chief product of the mine. Not active in 1929.

resemble great gashes when seen from the narrowed stream divides above them, appear within two miles of the plains. It is characteristic of the region that the main streams, and therefore the highways, course thru the deepest and narrowest canyons up to about 8,000 feet, at which elevation the relief is appreciably less. This is especially true of Boulder Canyon and the highway along it, and results from the more rapid eastward dip of the stream and road gradients as compared with the summits of the enclosing mountains.

So closely do the rugged mountain forms press upon the plains

to the east that only to a minor extent do the filled but narrow bottoms of the creeks carry the mature irrigated agriculture of the Boulder Valley into the mountains. Narrowness of valley and steepness of slope quite prevent such utilization altho there are a few "ranches" in the lower parts of each of the canyons (Left Hand, Four Mile, Boulder, Sunshine, and James Creek). In the region above 8,000 feet, where occasional park-like areas free of tree growth are common, relief and steepness of slope do not present obstacles, but the reduction of mean summer temperature here limits the range of crop possibilities. Nevertheless, there are a few stock-raising ranches in this higher country, especially between Nederland and Cardinal. On such farms some dairy cows are maintained—supplying fresh milk to the augmented summer population—as well as range cattle and horses; a few acres are cropped while small garden plots are a common sight in the villages.

Mainly however, the precipitous slopes and mountain summits are clothed by thick growths of small and medium-sized coniferous trees mixed frequently with aspen. The latter when it appears as separate stands, usually tells of forest destruction by fire or by man; few such stands are of recent development, however, most of the region being included within the limits of the Colorado National Forest. As a reflection of the considerable altitude of the region, tree growths are especially thick and luxuriant on north slopes whose protected exposures prevent the rapid melting of snow.

The snowfall has a distinct March and April maximum, and the annual average of well over six feet in the lower altitudes is presumably in excess of that for the region as a whole. None of the communities of the region is rendered inaccessible thru heavy snowfall, however. Regular stages run daily to Ward and Nederland; there are daily deliveries of mail by automobile thruout the winter, pleasure and commercial vehicles use the roads freely, and the twelve small public schools are in continuous service then also. All the roads available in the summer are not, to be sure, used during the winter, the season as a whole being a time of general reduction in traffic. A few of the permanent residents of the mountain region are employed in the work of road clearing and maintenance.

LANDSCAPE RECORDS OF METAL MINING

The absence of the usual earmarks of agriculture is not so noteworthy a situation as the prevalence of quite other types of man-made features. In this region there are typically revealed various stages in the slow decadence of what was originally an active-mining industry, on many of whose cultural forms the features of a summer resort activity have lately been engrafted.

Extensive Underground Workings. It would indeed be difficult to select a point commanding a view of any considerable area which did not present the material evidences of this decadent industry. Very conspicuous are the brown-yellow mine dump piles standing at or below mine entrances, and representing the accumulation of years of underground work. Their great variation in size is indicative of the extent of the mine whose construction furnished the material. There is considerable range, too, in their location. Commonly an extensive view of a mountain slope reveals a number of such mines at various elevations, many in seemingly inaccessible places (Fig. 4).

FIG. 5. A characteristically built mill in Four Mile Canyon. In the background typical wooded slope. In the foreground the track leading from the tunnel to the mine dump.

Numbers of Prospects. Less conspicuous than the mines are the hundreds of prospect holes now partially obscured by the tree growth which has taken place during the decades that have passed since the period of active prospecting. There is observable today little surface evidence of what is known to have been the original type of mining in the region—placering or gulch mining.[4] This type of mining required the construction of no permanent machinery or equipment beyond cradles or rockers and possibly the

[4] C. W. Henderson. Mining in Colorado, op. cit., p. 29

construction of a flume. Moreover, placering had run its course in a few years, leaving no conspicuous marks of its former existence.

Many Abandoned Mines and Mills. A closer view of a large number of mines indicates that their entrances are closed; the mine mouth shelters are in partial ruin; tunnels or shafts are watered and dangerous of entrance; the small car-tracks over which ore cars were wont to run have been torn up or partly buried; and surrounding buildings are in a state of disrepair. A characteristic scene, too, are the concentrating mills, mostly closed or derelict, but a few in operation. These are often built against the valley walls, the slope of their roofs corresponding with the declivity of

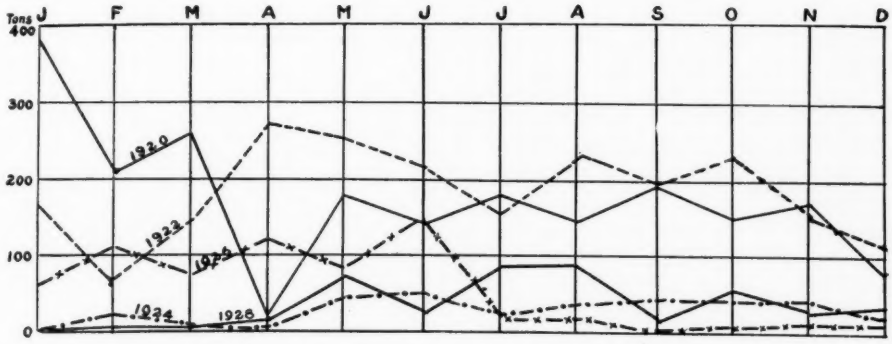

FIG. 6. Ore receipts at the Boulder Ore Sampler for selected years of the last decade. This company does not handle all the ore of the region but is thought to be representative of the region.

the valley (Fig. 5). Many of these are notable in size, and, standing along highways and roads, serve as frequent reminders of the relatively greater activity of mining in the past.

The mills are of especial significance. In the earlier stages of hard rock mining the free milling (oxidized) ore secured near the surface offered little resistance to attempts to retrieve the valuable metal from the ore. This constituted the "rich ore" of the region. Thus for the first few years, the simple arrastre[5] sufficed for freeing the metal from the rock; but these were shortly replaced by the more efficient stamp mill. In the percentage of recovered metal

[5] The following description of the arrastre is taken from Professional paper 138, U.S.G.S. p. 29. "An arrastre is a circular trough, generally ten or twelve feet in diameter, in which other heavy stones called mullers, are dragged around continuously, thus grinding up the quartz. They were generally run by water." (The remains of primitive mills may be found in the vicinity of Cardinal, and doubtless careful search would reveal others.)

the stamp mill was superior to the arrastre but still it was recognized that large amounts of metal were lost in the tailing pits. This loss became a matter of increasing concern as the mines went deeper to inferior ore, because it became more difficult to dissociate the valuable parts from the worthless. The situation allowed free play to the ingenuity of the producers in the methods devised for refinements in the milling and concentrating process. Moreover this was essential because it soon became necessary to ship increasing quantities of the ore some distance to the smelter, for treatment. The concentrating process, which results in making the ore more valuable per ton, made it possible for mining to continue even under the conditions of less valuable crude ore. This problem was met, at least temporarily, in so many different and complicated ways, that it was possible for one investigator to say about 1915, that there were almost as many types of concentrating processes as there were mills.[6] No one type of concentration was found to be satisfactory for the different mines, nor, unfortunately, for any one mine over an extended period. This has required new mill construction and readaptations of existing mills and processes at so many different times that the mills constitute an impressive factor in the landscape.

The Nederland Tungsten Belt. The general decline of mining activity which has occurred since 1892, a decline chiefly associated with the gold-silver mines, was interrupted significantly during the World War by unusual activity in the "tungsten belt." This mineralized zone is largely confined to upper Boulder Canyon and to the vicinity of Nederland. Under the stimulus of war demands, the tungsten district was the scene of a boom not unlike those of earlier days. Nederland expanded rapidly in size and the camp of Tungsten was added to the local mining communities. The time of extreme activity was short-lived in this case, the production of tungsten falling off rapidly at the close of the war. This was accompanied by the reduction of the resident population in the tungsten belt, the closing of mines and the silencing of many of its mills. These mills were not only located within the tungsten region but on the outskirts of Boulder to which ore had been carried for treatment. As the map indicates, a considerable number of tungsten mines have been active within recent years.

[6] P. G. Worcester. The Geology of the Ward Region, Boulder Co., Colo. Colo. Geol. Survey Bull. 21, 1920. p. 10

Present Status of Mining

A trustworthy idea of the present condition of mining cannot be gained, however, by a cursory view of the scenes usually witnessed and above described. It is popularly concluded from these scenes that the mining industry is in a state of collapse and not a few writers, thru incautious observation, have given this impression to their readers. It is not argued of course that the industry is thriving, but merely that there is general misunderstanding of the completeness of its abandonment. The idea that the industry

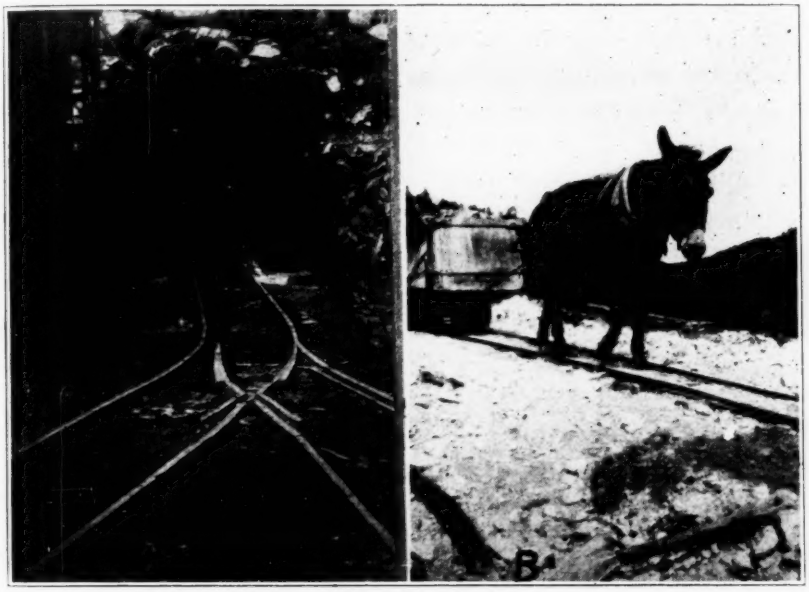

Fig. 7a. Entrance to the Wood Mountain Mine, near Wallstreet. The track to the reader's left leads cars to mine dump; the track to the right takes the ore to the mill.

Fig. 7b. Method of carrying ore from Wood Mountain Mine in 1926. In 1929 mules had replaced burros as beasts of burden at this mine.

is in a state of complete collapse is disproved by the statement that during the past decade about 300 mines in the region here studied have been officially listed as "operating" or have been known to have produced some ore during that period.[7] The locations of these mines have been diagrammatically shown on the map, being re-

[7] Within recent years the State Bureau of Mines has annually published in its report lists of operating mines in each county. It will be found that the number of different mines listed by the Bureau as operating in the past decade is smaller than the number arrived at in this paper. A very considerable number of mines referred to in this paper as "active" being manned by a small amount of help, have furnished only

lated to the nearest town. It may be inferred that these mines are actually distributed at some distances from the communities and are grouped in this way merely for convenience. Many characteristics of the industry contribute to the general misunderstanding of its present status.

Intermittency of Activity. Altho as stated above there have been some 300 mines active during the past decade, a relatively small part of this number is ever active simultaneously (usually not over thirty), and not one has been in continuous service for the period stated. Typically the smaller producers are active only for part of a year, perhaps only a few weeks, a large number of them being operated under lease from the owner. The larger producers, in general, are in operation for a longer period, not a few having been active for five or more years. These facts suggest the possibility that one of the most important factors in this region is the great number of mines driven in the period of mining activity in the past. It would seem that a mine once constructed is a factor working for the continuance of its use in the future, even tho conditions change in the meantime.

Periods of activity are not as directly related to particular seasons of the year, as is generally supposed. Contrary to popular belief, the summer season is apparently not one of increased production. Such direct seasonal relation was possibly true of the early stages of surface mining, but with increasing depth the industry has been released from any seasonal handicaps which may have impeded it. The graf of ore receipts at the Boulder Ore Sampler is advanced as evidence of this conclusion.[8] (Fig. 6).

All Active Mines do not Produce Ore. Many mines, for one reason or another, may be included in the yearly list of "operating" mines and yet produce no ore for the period. In some cases, at least, this non-productive activity is evidence of the preparation

---

small quantities of ore and for that reason were not referred to officially as "operating." That a particular mine has actually produced some ore during the period studied is here assumed to be sufficient grounds for distinguishing the mine from those which have produced nothing, in which group there is also a considerable number of mines.

[8] This conclusion is possibly not applicable to the annual production of tungsten and fluorspar. The writer has not had recourse to sufficient production data in these cases to arrive at any conclusion. The Boulder Ore Sampler, a concern which buys ore from producers, considerately allowed the writer to secure data from their records. The Sampler, however, deals only in gold-silver-lead crude ore or concentrate.

of the mine or mine property for expected production at some future time, and thus is representative of a healthy condition. A case in point is the Alaska Tunnel at Ward, the driving of which, it is said, will ultimately combine the properties of many small mines now unconnected.

Location of the Larger Producers. Very few of the active mines of the last decade have been large producers in the sense that the term is used in more active mining regions. But in relative terms it is true that the greater proportion of the total mineral product of the region is to be accounted for by the output of no more than a dozen mines. It so happens that many of these mines are not in the vicinity of the traveled highways; if they were, possibly a more correct impression would be gained regarding the state of the mining industry. Among the more isolated mines which have accounted for a very considerable portion of the output are (or have been) the Logan and Yellow Pine near Crisman, the Wolf Tongue (tungsten) properties at Nederland, the Boulder County Tunnel at Cardinal, the Caribou mines at Caribou and the Wood Mountain Mine at Wallstreet. (Fig. 7).

Disposition of the Ore. Within recent years, the products of the mines have reached market in different forms and in relatively complicated ways. In fact, the process of producing the metal from the bulk of the ore is not completed within the region, a situation requiring that the mine product leave the region in forms which have little or no resemblance to the traditional gold product. The greater part of the gold-silver-lead ore taken from the mines is subjected to the concentrating process in mills close to the producing mines, usually owned and operated by the larger producers. The product of the mills (called a "concentrate"), which is often twenty times as valuable per ton as the ore taken to them, is then loaded on trucks and taken principally to Boulder and there transferred to freight cars and taken by railroad to Leadville (approximately 300 railroad miles away) or to Colorado Springs (approximately 90 railroad miles away) for reduction and treatment. Some of the crude ore taken from the mines is, however, not concentrated but is shipped as a crude ore directly either to the smelters at Leadville or to the reduction mill (the Golden Cycle) at Colorado Springs. For example, in 1928, some 19,599 tons of ore (other than tungsten and fluorspar) were mined in Boulder County. Of this amount 16,300 tons were run thru concentrating mills near

the producing mines, from which process 690 tons of high grade concentrate resulted. The latter amount was shipped to Leadville and to Colorado Springs. Of the remainder, 3,153 tons were shipped as a crude ore to Colorado Springs, and 146 tons to Leadville. Altho yearly figures fluctuate both as to total amounts and as to proportions shipped as crude ore and as concentrate, the above figures are quite representative. Other data may be secured from Mineral Resources.

As to the present importance of mining it is certainly true that altho the actual output is small, the industry still represents the

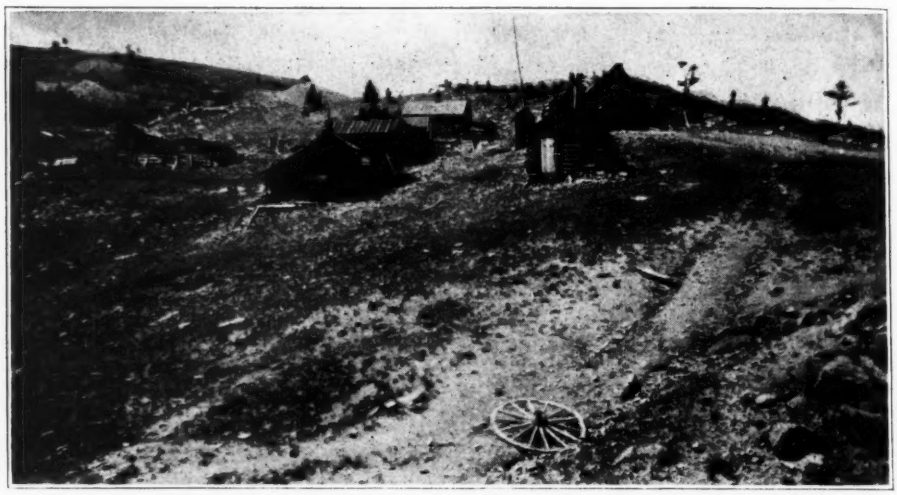

FIG. 8. A partly abandoned mining camp (Caribou). This camp has not been transformed into a resort center.

one permanent employment of the resident population of the Boulder mountain region.

SUMMER RESORT ACTIVITY

A feature of the mining industry during the period of its expansion was the coincidental growth of mining camps in the localities of greatest production. In them, many activities were concentrated, having as they did the dual functions of providing homes for miners employed in nearby mines, and acting as centers of retail trade and social life. For these reasons, too, they varied considerably in size. Ward was the first large camp, closely followed by Jamestown and Caribou, while Nederland, as already

noted, arrived at this estate at a later period. Some of these original camps had sites at slightly widened portions of the creek bottoms, such as Crisman, Rowena and Sunset, while others developed in less confined surroundings on hill tops, such as Gold Hill, or possibly in wide open valleys—as Eldora and Nederland.

The sizes of the communities expanded and contracted in sympathy with the success of mining in their localities, this activity being their only dependence. Thus it was natural that, with the general decline in mining, slow abandonment of the camps took place. Abandonment took place, to be sure, but there still remained the physical equipment of the camps—houses, streets and store buildings, in a region distinguished by its wild beauty, rugged mountains, considerable altitude and immediate view of the serrate summits of a notable section of the Rocky Mountains. Such were the latent qualities of the summer resort.

Sites of relative ease of access combined with sightly location, distinguish today the original, largely unaltered, partly abandoned mining camps, from the resort towns which altho they still retain much in their make-up of the mining camps from which they grew, have unmistakably peculiar features. (Fig. 8). Thus Crisman in the narrow confines of Four Mile Creek is quite accessible and so also are Salina, Wallstreet, Rowena, Summerville, Sunshine and Sunset. In numbers of miles from Boulder, these camps have decided advantages over the recognized resort centers—Gold Hill, Ward, Eldora and Nederland. But the latter possess the qualities of sightly location, elevated as they are above narrow creek bottoms and commanding full sweeps of pleasing natural landscape, combined with cool summer temperatures. These towns are also of reasonable access and distance, connected as they are by well-graded automobile roads. In this mountain region, access is not always a measure of numbers of miles. For natural beauty, the camp of Magnolia has many attractions and is moreover only ten road miles from Boulder. However, Magnolia is approachable only by a very steep and narrow road, satisfactory for wagon traffic for which it was designed but never improved for automotive use, tho used occasionally by automobiles. Likewise, Cardinal and Caribou, not appreciably more distant than Eldora, are still largely unaltered abandoned camps, tho commanding a view of the range and nearby country quite as fine as any other. Here again a rela-

tively narrow and steep road stands in the way of easy access.

The population of the resort towns expands in the summer and shrinks markedly in the winter. Probably never are all usable houses occupied, but they are most nearly filled in mid-summer and especially over week-ends at that time. The expanded population is derived largely from the piedmont cities and also from Texas, Oklahoma and Kansas. Thus, the proportional circles showing the residences of the towns have their limitations as true comparisons of their relative importance. Based on permanent resident population there would be a quite different alignment. In this case Eldora and Gold Hill, especially the former, would shrink to small proportions, indicating almost complete summer resort nature. Jamestown, on the other hand, is much more stable and remains nearly the same size the year-round. Nederland shrinks noticeably but perhaps no more in proportion to size than does Ward, but in these cases, in contrast with Eldora, there is a considerable population left. The smaller camps near Boulder, some of whose populations are employed in that city, are not subject to so great seasonal fluctuations as are those of a more completely resort nature.

Conclusions

Nothing is more striking in this mountain region than the clearness with which cultural forms reflect the stages in man's occupancy of the site. Man-made features of a derelict nature indicate not merely the slow decadence of the metal-mining industry as a whole, but record different stages in its rise and decline. Equipment introduced during one period has as frequently been remade or modified in a later period as have these earlier forms been completely abandoned. Specifically, the presence of mining equipment introduced during the earlier period of high-grade ore has occasionally made it difficult for the industry to respond quickly to the different requirements of a later period of low grade ore. The times of inactivity created by this sort of delayed readjustment, may currently be misinterpreted as complete collapse of the industry itself, thru assumed exhaustion of ore bodies. Clearly the metal-mining industry persists into the present thru the inheritance of considerable physical equipment developed in the past; in this case so far as the mines themselves are concerned, there is monumental evidence of man's vigorous endeavor. But quite as clearly the very presence of mining equipment adapted to past conditions stands

in the way of sweeping changes which might be made to accommodate the equipment to the type of ore currently available. The resort towns themselves in their very location and appearance, represent the penetration of the active mining days into the present, and probably into the future. It is more than ordinarily significant that the larger mountain towns of today were also the notable mining camps of the past.

THE GREAT KARROO OF SOUTH AFRICA

L. H. HALVERSON
University of Wisconsin

A SEMI-ARID SMALL STOCK PASTORAL REGION

Shut off from the coast by the folded ranges of the Cape, set off on the north from an even less hospitable region by the Nieuveld, Sneeuwberg, and other minor ranges, lies an elevated region of scattered sheep, goat, and ostrich farms, the roughly rectangular Great Karroo (Fig. 1). Here great flocks browse upon the scanty

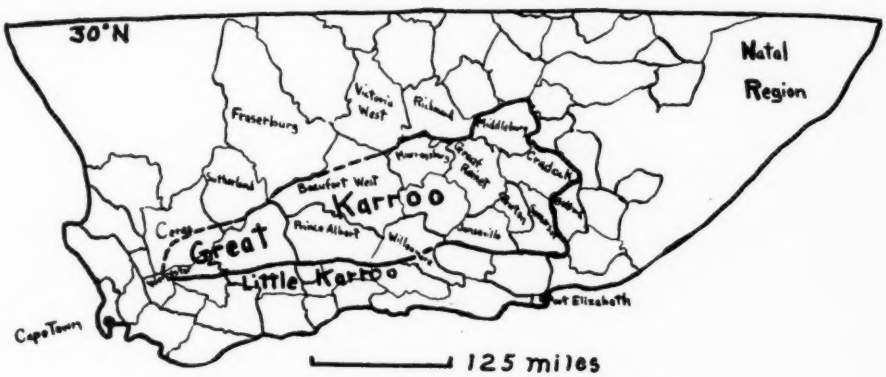

FIG. 1. Index map showing the Great Karroo

herbage, with black herdsmen or woven wire protecting them from marauders.

Only around the widely spaced European farm homes are trees seen, and here they owe their presence to irrigation water. However, where over-grazing, burning, or other abuses have not been practiced, there are plenty of widely spaced prickly shrubs and

small bushes, some of which are succulent enough, especially after the few showers that fall in summer, to give good browse for sheep and goats. To the east in the Karroo the country is slightly more green, and after the rains some little grass springs up, in addition to the low succulent shrub which the sheep eat.

The region appears not to present the monotony of sky-line which is characteristic of the Great Plains of the United States. In its elevation of from 2000 to 3000 feet it is comparable, but tho flattish in general, in detail it is in many places broken by isolated hills or even by chains of hills.

In the brilliancy of the air, the dry warmth of the days and the relative coolness of the nights one is reminded of the deserts of North America between the Rocky Mountains and the Sierra.[1] The efficacy of the climate in curing diseases of the respiratory organs, mentioned by many writers, gives an added key to its characteristics.

But to many travellers the landscape of the Karroo would appear entirely lacking in charm or promise of economic usefulness. To such casual observers the region is virtually a desert, since it bears no green herbage except for a week or two after a rainstorm. Droughts, as in all semi-arid regions, are the bane of the existence of the farmers.

In this region equal in area to the state of Indiana, there is a population somewhat over 30,000, made up of approximately equal thirds of whites, "coloureds," and blacks. The natural conditions suggested, while reaching their most typical development in the Great Karroo, fit, with slight modifications, a much greater area of the so-called "high veldt" of the interior of South Africa.

At its western end the region narrows almost to a point, its boundary being marked by somewhat rough topography and aridity to the northwest, and modified Mediterranean climatic conditions on the west and southwest. On the eastern side of the region there is a gradual transition from the semi-arid conditions of the Great Karroo to a better watered region where cattle are grazed and sedentary agriculture is practiced.

It is admitted by South Africans that the wealth of the Karroo lies in its pastoral resources rather than in agriculture.[3]

[1] Bryce, James, Impressions of South Africa, p. 33-34
[3] Nathan, Manfred, South Africa from Within, p. 209

LAND UTILIZATION IN THE KARROO

Tho described as a "desert waste where it takes six acres to keep a sheep,"[4] more modern estimates place the carrying capacity at approximately four acres per sheep for efficiently paddocked lands, while in the eastern border lands of Cradock and Somerset East the capacity is estimated at one sheep to two acres.[5] The extensive nature of the pastoral activities in the region is shown by the estimated size of the paddocks required. In all but the eastern borderland transitional portion of the region, paddocks of 2000 or more acres are deemed a requirement, while in the somewhat better watered districts typified by Cradock the required size of paddocks is estimated as between 1000 and 2000 acres.[6]

In the areas east and north of Beaufort West and Willowmore the average distance which stock are driven to water is over two miles and less than four miles, while in the above districts and to the west and southwest the distance is estimated as four miles and over.[7]

It has been said that the cultivation of crops in South Africa is becoming demarcated and characterized for the different rainfall zones. In the 5 inch to 15 inch zone which includes the Karroo the vegetative growth is classified as saltbushes, prickly pear, and various perennial fodder trees and shrubs.[8] This contention seems born out by conditions in the Karroo, for in general less than one per cent of the region is in agricultural crops, and much of the very small area in crops is irrigated. The additional irrigable land, were it improved, would not be significant because of its small area.[9] Crop land and potential crop land is of greatest importance in providing forage for stock in time of drought and poor browse. Tho insignificant in total acreage, wheat is the most important cereal crop in the region. In commenting upon the practice of growing wheat, it has been said:

> . . . The growing of wheat in the Karroo, by the sheep farmer, is not using the soil to the best advantage. Alfalfa pays better, gives less trouble, is a far more reliable crop, and, in a drought, will save hundreds of sheep.[10]

[4] Bryce, James, op. cit., p. 46

[5] Union of South Africa: Final Rept. of the Drought Investigation Commission, Oct., 1923, map VII

[6] Drought Investigation Rept., map VIII. [7] Drought Investigation Rept., map IX

[8] Leppan, H. D. & Bosman, G. J., Field Crops in South Africa, p. 11

[9] Union of South Africa, Office of Census and Statistics, Third Census, 1921, Statistics of Agricultural and Pastoral Production, Table 20

[10] Drought Investigation Rept., p. 146

While data show that cereals, forage crops, fruits and the vine occupy land, their growth is supplementary or incidental to the pastoral industry, which utilizes the great bulk of the land of the Karroo.

The Small Stock Industry

The earliest systematic European invasion of the Karroo was by Dutch cattle drovers, who pastured their cattle in the region after the summer rains. These cattlemen appear to have migrated from the Cape region of winter rain to the interior region of summer rain from season to season, moving their goods and families from place to place in great covered wagons drawn by several yoke of oxen.

Prior to this European movement into the region it appears that the Hottentots, a migratory people living in part from their herds, were the more important inhabitants of the Karroo. But the Hottentots, with their tribal organization, succumbed in great numbers to smallpox epidemics during the eighteenth century. The scourge of a European disease carried to a primitive people left much of the Karroo unoccupied except by the very backward Bushman. The lack of a tribal organization hindered the transmission of smallpox among these people, but since they molested the herds

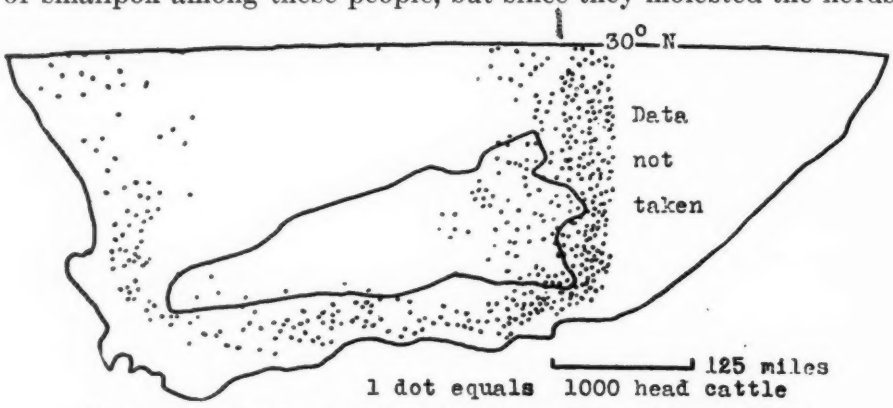

FIG. 2. Distribution of cattle (1921 Census, Union of South Africa)

of the Boer cattle drovers, war was carried on to the death, and the Bushmen largely exterminated.

Apparently as a result of the occupation of the free grazing lands of the winter rain region by settlers of more or less sedentary habit, the roving Dutch came to spend more and more of the year in the Karroo. Since the forage is of the nature of browse rather than grass, wool and mohair perhaps somewhat easier to market than

cattle where markets are distant in an arid region, the winters dry and relatively cool with very little forage, the drovers turned to sheep and goats. The maps showing cattle and small stock (sheep and goats) distribution give a picture of the present situation. (Figs. 2 and 3). Cattle are practically absent except in the somewhat better watered east.

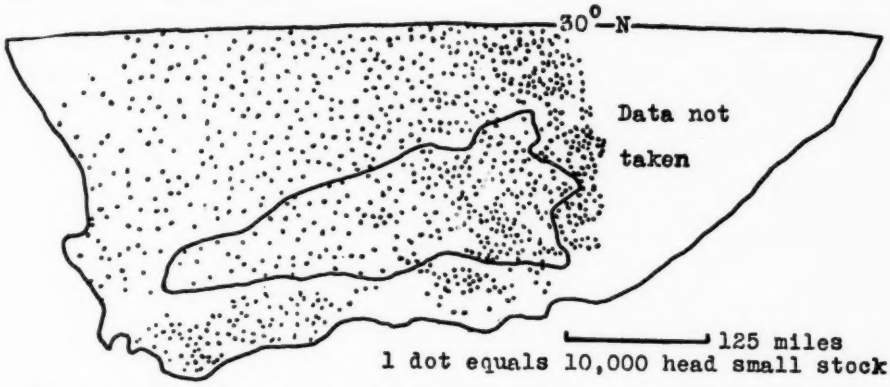

FIG. 3. Distribution of sheep and goats (1921 Census, Union of South Africa)

In the Karroo Angora goats, the producers of mohair, far out-number the other types of goats. The distribution of sheep and goats in the region seems to be lacking in elements of proven geographic significance, yet appears to be rather complementary. In totals in the region, sheep out-number goats.

It has been stated that "tracts of rough ground, covered with patches of thick, scrubby bushes, are turned to account as ostrich farms."[11] With the great decrease in the number of ostriches kept in this southeastern area, it may be that this rougher land is being utilized for mohair production, as the goat would better utilize the browse on this ground than would sheep.[12] In recent years it is only in this southeastern section of the region that there has been any marked increase in the numbers of Angora goats.

FORAGE PLANTS

Under conditions of semi-aridity, with the precipitation coming often as torrential summer thunderstorms, and with the vegetative cover reduced to a minimum by stock during the long winter period of little or no precipitation, over-grazing and careless handling of stock results in great deterioration of the range and a reduction in

[11] Bryce, James, op. cit., p. 453
[12] Census of Agriculture, 1925, p. 43

carrying capacity. In the Karroo the practice of "kraaling" stock, as well as over-grazing, has resulted in a decreased vegetative cover, increased run-off and erosion, and great stock losses thru drought and starvation.

The whole of the Karroo has been classified as a vegetative region of desert shrub.[13] Since many rainless months in winter are normal for the region, damaging droughts result only when the summer rains fail. Drought in the region has been defined as "a period when grazing has become so scarce and the supply of water at drinking places so diminished that loss of stock results."[14]

The original natural vegetative cover appears to have been in a large part made up of perennial succulents with fleshy stems and leaves, with grasses becoming of some importance in the less dry east. With the over-stocking of the range the perennial plants are destroyed, and their places taken by ephemeral annuals which spring up after the infrequent rains but are relatively useless for grazing purposes. The perennials give a much more certain carrying capacity because they do not need rain at such frequent intervals.

"Kraaling Stock"

The practice of "kraaling" stock nightly has had a very baneful influence upon the success of the pastoral industry in the Karroo. This practice consists in herding the stock each night in the home kraal or barnyard. This is in part done to guard against depredations of the jackal, which regularly takes its toll of sheep. The kraals are, therefore, jackal proof. Further, many stock farms have but one source of water for drinking purposes, and it is therefore necessary to bring the herds in for water. The long drives night and morning not only take away from the strength of the stock, but result in much trampling of pastures, with destruction of the vegetative cover, followed by gulleying and destructive erosion. In addition, these crowded kraals serve as hosts for various parasites which undermine the health of the flocks.

The abandonment of the "kraaling" practice has been urged for many years and is taking place, but since it involves great expenditures for jackal proof fencing and additional sources of water, it is necessarily slow to come. There is usually a plentiful supply of native labor which can be hired reasonably to serve as "herds" for

[13] Shantz, H. L. & Marbut, C. F., The Vegetation and Soils of Africa, Plate I

[14] Rept. of the Drought Investigation Commission, p. 4

stock, so that the expense of providing paddocks where stock can graze freely day and night may appear to be uneconomic.

THE LABOR SUPPLY

The pastoral industry is not a heavy user of labor, and "hands" are available for a hire of two to three shillings per day. The labor of a whole family may be had for board and housing, and a few pounds per month. The housing is a minor problem, for the native laborers live on the farms in rude wooden huts or shanties, either provided for them, or built by them of sods, wood, and thatch provided by the farmer. Sods are used as roofing material even in some of the houses in which Europeans live, but the fact that in times of the occasional torrential rains of summer such roof material results in mud washing into the rooms has caused corrugated iron roofs to be greatly favored. The absence of trees for lumber and of sufficient vegetative cover to provide thatch for roofs or walls is reflected in the make-shift materials used in the huts of the natives. The native of the Karroo must of necessity be attached to some landholder, as "squatting" is legislated against, and very little land is held by natives in the region.

With the cutting up of the larger farms, it appears that the proportion of persons of European blood engaged in making a livelihood in the region is on the increase. In 1895 the proportion of white men to native servants was about 3 to 25, or a ratio of one to eight.[15] In 1925, thirty years later, it appears that of the total male and female population living or working on farms the ratio of white to persons of mixed and colored blood varies from 1 to 1 to 1 to 3.[16] The variation of the ratios from district to district shows nothing of definite geographic significance. In some districts the "coloured" population, persons of mixed colored and white blood, are more numerous than the pure natives. The "coloureds" very often occupy minor supervisory positions on the farms, with the pure blooded natives doing the heavier work.

With an abundance of cheap and fairly satisfactory labor for the task at hand, it is small wonder that the Karroo sheep farmer has been slow to change his pastoral practices. However, once the wire is erected and water provided, the need for labor is immediately cut, the carrying capacity of the land becomes greater, and the

[15] Bryce, James, op. cit., p. 454

[16] Agricultural Census, 1925, op. cit., Table 30

productivity of the flocks is generally increased. It appears that the practice of paddocking, which earlier appeared uneconomic in the light of conditions in the region, now has been proven profitable and therefore desirable.

THE DROUGHT MENACE

When a region is over-stocked and a drought is experienced, with the resulting lack of feed as well as water, the losses are enormous. In the relatively well-watered district of Cradock data

Fig. 4. Landscape in the eastern Karroo. In the center is a site for a "dam" for conserving water for stock. The foreground suggests the sparseness of the vegetative cover. Courtesy, Union of South Africa Government Offices

in a recent year show total losses of sheep and goats from drought and exposure to be over 55,000.[17] Other districts show comparable losses. The increased run-off which accompanies the deterioration of the vegetative cover and the consequent erosion has resulted in less soil water and more intense drought conditions. Many farmers declare that the rainfall is decreasing, but data where kept do not support this contention.

While it seems agreed that in times of drought more stock die from lack of water than from lack of forage, efforts are being made to increase the forage resources of the region thru the introduction

[17] Agricultural Census, 1925, op. cit., Table 30

of drought resistant plants. Where the prickly pear has been introduced it thrives, but since its spines must be removed before it can be used for forage, its utility seems limited. The American aloe has been introduced also, with varying reports as to its value as a forage standby in times of drought. Experimentation is being carried on with spineless cacti. The importance of drought resistant forage plants is great, since only by keeping up the strength of the stock can the necessary long drives to water be made without great losses. The soils, of a gray or reddish sandy desert type, calcareous and entirely unleached, capable of heavy productivity were water available, are capable actually of producing only browse for stock.

WATER FOR STOCK

In a region where water is so essential to success, it would seem that all water resources would be fully utilized. Dams are built across many of the ravines which carry off the silt-laden surface waters, but such water resources are quickly contaminated, and as well are not sufficient to tide flocks over the long periods of drought. The localization of such water supplies in addition necessitates long drives of stock.

One of the solutions of the problems of the Karroo stock farmer lies in the increased utilization of the ground-water. In most of the region ground-water is plentiful and not at great depths from the surface. Water can generally be reached at a depth of fifty feet, and will in some cases rise so that it need only be pumped thirty feet.

There are many more stock watering places in the region in which the water is derived from storage in dams than from wells and boreholes. In the typical district of Prince Albert, with an area about twice that of a large sized middle-western county, there were in 1921 about forty boreholes, 10 springs, and 30 wells used for watering stock, out of a total of 250 drinking places. The remaining sources of water were dams or reservoirs, never reliable in an extended drought.[18] If the advantages of paddocking stock are to be fully realized it is necessary that there be more drinking places. These can only be placed where they will do the most good, thru avoiding long drives to water, by putting in wells or boreholes at strategic points.

The weight of the fleece carried by sheep in the districts where

[18] Drought Commission Rept., op. cit., maps IV, X, XI, XII, XIII

droughts are common, and long drives to water often necessary in the heat of summer, is of great importance. Farmers are severely criticized for attempting to pack twelve pounds of wool on the back of a sheep in localities where a seven or eight pound fleece would effect a reduction of the potential loss by perhaps 50 per cent during a drought.[19]

STABILIZATION OF INDUSTRY

While it is generally agreed that pastoral activities present the best use of the land in the Karroo, it is apparent that the utilization

FIG. 5. A homestead on a sheep farm. The windmill in the center of the picture is a feature of nearly every South African farm. The black "herds" watching the sheep are typical. Courtesy, Union of South Africa Government Offices

has been mainly of the extensive, exploitive type. Progress has been made in the improvement of the types of stock, with resulting improvement in the quality of the wool and mohair clip. The substitution of the practice of paddocking for that of kraaling in the handling of small stock is making great advances, and more and more jackal proof fencing is being erected. The cheap land in the region enables it to compete readily with other great wool producing areas. The growth of forage crops under irrigation to supplement the pastures in time of drought is increasing, while the production of cereals is apparently on the decrease. With the advance of modern scientific practices, and the development of the water

[19] Ibid., p. 147

and forage resources of the region, the pastoral industry should be able to avoid to a large degree the great losses, direct and indirect, which have heretofore characterized it in periods of drought. Such a stabilization of the industry would be of value not only to the Karroo region, but to the whole of the Cape Province.

Commercial Activities

Since the inhabitants of the region are most largely engaged in the pastoral industry, the commercial transactions are rather definitely limited to the handling of the products and purchases of the pastoralists and their dependents.

Wool, mohair, skins, and hides, a relatively short list, includes all the surplus products of the region of any great importance. At the present time ostrich feathers are unimportant in both value and quantity. Butter, cheese, bacon, and ham are produced in small quantities locally, but largely for home consumption.

In a region such as the Karroo, where distances are great and the population sparse, transportation facilities are likely to be poorly developed. One railroad line proceeds inland from Cape Town and passes thru the western half of the region. To the east, two lines enter the region and connect at Klipplaat in Janesville, one coming from Mossel Bay and the other from Port Elizabeth. From Klipplaat a single line runs north into Middelburg, where a connection is made with a second line from Port Elizabeth. From Middelburg there is a connection to the northwest at DeAar junction with the western line from Cape Town. To the north connections are made with Kimberly. The railroads appear to be "thru lines," making their way to the rich mineral deposits to the north. This is evidenced by the fact that there are no stub or feeder lines in the Karroo, as well as by the fact that the service is subject to criticism.[20]

The course of the line from Cape Town east thru the Karroo is without doubt in part related to the fact that by following the trend of the Karroo north of the SwarteBerg the full advantage of following the contours of the surface on the route to Kimberly is realized. The road leaves the Karroo as the more productive part is approached, as to continue in the region would necessitate not only a longer route to the Kimberly district, but would result in higher costs as a result of more irregular topography. The paucity

[20] Drought Investigation Rept., op. cit., p. 191

of rail transport is especially serious in times of drought, for the distances to railroads are so great that it is impossible to drive the weakened stock to the railroad where feed might be procured or the stock shipped out.

It appears that heavy wagons drawn by six to a dozen spans of horses, mules, donkeys or oxen, are the main feeders of the railroads. Trains of such wagons, with native teamsters, carry the bulky products of the region to the nearest point on a railroad. On

FIG. 6. Typical rural road-wagon transport in South Africa. Note the native "Voor-looper" (leader) at the head of the team. Courtesy, Union of South Africa Government Offices

the return trip they carry lumber, farm tools and implements, and foodstuffs which the farmer cannot produce on the home farm. Automobiles and trucks are increasing in popularity, but the fact that most of the roads of the region are merely beaten paths across the broad expanse of scrub-covered surface has hindered the extensive use of automotive equipment. Without hard surfacing material, such tracks become deep ruts which rule out any type of transport other than the high wheeled wagon. In the rare times of torrential rains, these tracks become impassable even to the type of transport

best fitted to cope with them. At such times, however, the teamsters have to wait only a few hours for the drying out of the roadways, as the sun and the dry atmosphere soon do their work.

The backwardness of transportation in the Karroo is at least in part a result of the small quantity of freight available, which does not warrant railroad development, and in many cases apparently does not warrant the building of good roads in a region where road material is not plentiful.

In the Karroo, where commercial activities are simple and direct, commercial centers are few and small. Graaf-Reinet, the largest town in the region, had in 1921 a total population of a little

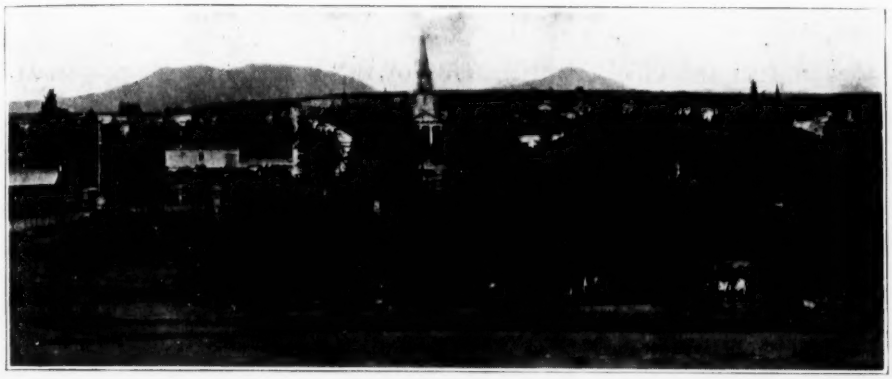

FIG. 7. The town of Cradock in the Great Karroo. The town lies in the valley of a river, which supplies the water for the vegetative growth. Courtesy, Union of South Africa Government Offices

over 9,000 of which about half was European. In 1926 the number of Europeans had increased very slightly. There are only three or four other towns in the region with populations of over 2,000. In most cases the Europeans appear to be about one-half the total.[21] Some of the towns and hamlets serving as commercial centers are situated inland off the railroad, but may have a station bearing their name at the nearest railroad point. From these stations which line the railroads at intervals of a few miles the products of the region are shipped to the coastal cities, and the incoming goods wagoned to the consumer in the Karroo.

Industrial activities are practically absent in the region. Household industries and some little native industry may be practiced, for local use only. The raw products of the region are shipped out

[21] Union of South Africa, Office of Census and Statistics: Official Yearbook of the Union, No. 9, 1926-27, p. 879

without being processed in any way, while even in the coastal cities it has been the practice until very recently to export all wool without washing.

Much of the wool of the region eventually arrives in Britain to supply the mills there, while the mohair is largely exported to the United States, where it is manufactured into upholstery for various uses, the most important user undoubtedly being the automobile industry. In 1926, both wool and mohair production was profitable, with large production but relatively satisfactory prices. The continued lack of demand for ostrich feathers resulted in many more birds being slaughtered, their skins finding a ready market in the fancy leather trade.[22]

CONCLUSION

The full and efficient utilization of the Karroo will long present a problem. The small stock pastoral industry without a doubt represents the most efficient use of this semi-arid, drought-ridden region. However, it is only by the development of efficient scientific practices that the full potentialities of the region will be realized, and the Karroo take its place as a center of continuous large scale production of wool, mohair, and other minor products. To the geographer, one outstanding characteristic of the Karroo is the homogeneity of geographic relationships within the region.

[22] U. S. Dept. of Commerce: Commerce Year Book, 1926, Vol. II, p. 512

THE USE OF THE EXCURSION IN TEACHING COMMERCIAL GEOGRAPHY*

C. C. CRAWFORD
University of Southern California, Los Angeles
and
ROLAND WELLS GRINSTEAD
Washington Junior High School, Pasadena, California

This article undertakes to present some experimental data on the value of the class excursion or field trip as a means of enriching the course in commercial geography and also to offer a few practical suggestions on ways of making profitable use of the excursion as a teaching procedure.

Let us state at the outset that we consider the excursion to be merely one of several progressive teaching procedures, and not an educational panacea. Like most of the good things of life it may be misused, abused, or overemphasized.

Procedure of the Experiments

The investigation consisted of four experiments. Experiments A and B were of the rotation type, involving two groups, two experimental factors, and a rotation of methods at the middle of the total experimental period. Thus in Experiment A, Group I, consisting of 18 students, went on an excursion to a dairy while Group II, consisting also of 18 students, stayed at school and studied about dairying; and then Group II went to see a wicker furniture factory while Group I stayed at school and studied about furniture manufacture. Thus each group learned, at one time or the other, by each method, and there can be no great probability that inequalities of intelligence or of lesson content have been responsible for the differences in results achieved.

Experiment B was similar to Experiment A, except that the lessons were on meat packing and on automobile tire manufacturing. There were 22 students in each group in Experiment B.

Experiments C and D were equivalent group experiments, and not of the rotation type. In each case two groups of students were

* The authors set forth no claim that the type of material studied in these excursions is desirable geographical content. Their problem is to make the teaching of such material really function if it is to be taught.

paired, pupil against pupil, so that they were as nearly equal in intelligence and school status as could be arranged, and one group then went on an excursion while the other stayed at school and studied about the process which the first group actually visited and observed. Experiment C involved 26 students in each group and was based on the meat packing industry. Experiment D involved 56 students in each group and was based on the study of tire manufacturing.

The students in Experiments A and B were all very bright, having intelligence quotients of 125 or over, while those in Experments C and D were of average intelligence, the mean being 109 for Experiment C and 105 for Experiment D.

The procedures employed by the classes that stayed at school and studied were of a progressive and vitalized type. The teacher did his very best to make the lessons as effective as possible, by means of demonstrations, class experiments, films, and socialized class projects. Abundant library materials were available and were used freely. Effort was made to have these lessons represent the *best* that can be done in the classroom, and not the average or the poorest.

We shall not go into detail here to describe the procedure of the class excursions, reserving this for fuller treatment in the latter part of the article.

The time spent was the same whether the excursion or the school study method was employed, each lesson unit involving a fifteen-minute assignment followed by either a two-hour study-work-recitation period or a two-hour excursion.

The results were measured by a comprehensive test the next day after the excursion or class study of the topic. The tests included questions of the completion, best answer, true-false, matching, essay, and drawing types, in order that pupil knowledge might be measured in a varied and many-sided fashion.

RESULTS

The results of the experiments, as shown in Tables I and II, are uniformly favorable to the excursion method. The fact that the differences are statistically more reliable, or significant, in Experiments A and B than in Experiments C and D, in spite of the smaller number of cases, may possibly be due to the difference in intelligence of the students involved. In the first two experiments

they were all very bright, while in the latter two they were only average. Possibly the excursion method is relatively more profitable in the case of bright students than in the case of dull ones, but our data here are insufficient basis for a definite generalization. The differences in outcomes of the experiments may be due entirely to differences in classroom or excursion procedures, such as the size of the groups.

TABLE I

RESULTS OF THE TWO ROTATION EXPERIMENTS COMPARING EXCURSIONS WITH SCHOOL STUDY

Experiment	*Method*	*Average for Topic I*	*Average for Topic II*	*Total for both topics*	*Difference favoring excursion method*	*Chances that the difference is real**
A	Excursion	54.50	42.40	96.90		
A	Study	20.90	27.55	48.45	48.45	Millions to 1
B	Excursion	56.10	39.25	95.35		
B	Study	32.45	27.23	59.68	35.67	Millions to 1

* This column is derived by finding the ratio between the difference and its standard error. The available statistical tables only go up to chances of 3,400,000 to 1, and our differences here are larger than that.

TABLE II

RESULTS OF EQUIVALENT GROUP EXPERIMENTS COMPARING EXCURSIONS WITH SCHOOL STUDY

Experiment	*Average for excursion method*	*Average for study method*	*Difference favoring excursion method*	*Chances that the difference is real*
C	39.8	31.4	8.5	525:1
D	21.3	15.4	5.9	6,250:1

ADVANTAGES OF EXCURSIONS

We have seen that the statistical data favor the excursion method. The following considerations may explain why this is the case, and may go to show why more use might well be made of this plan of teaching:

1. The excursions are of more interest to the students than are the more bookish types of classroom procedure.

2. They give education a decidedly practical direction since they involve a study of the realities of life. In other words they help to bridge the gulf between the school and the world in which we live.

3. Well chosen trips afford valuable vocational or educational

guidance by offering the students a chance to explore and become acquainted with a wide range of occupational activities.

4. The excursions provide a useful fund of experience and mental imagery for the interpretation of the abstract materials of books.

5. A single excursion may provide experiences which will be of value in the understanding of a number of different subjects besides the one of which the excursion was a part.

6. The trips stimulate children to read in order to find out more about points in which interest has been aroused during the excursion.

7. They arouse interest which leads to valuable industrial explorations by students outside of school hours. Several pupils reported that they went on numbers of such trips in company with their parents after having discovered the idea thru the school excursion.

Some Practical Suggestions Regarding Excursions

We shall now consider a few practical matters which affect the success and educational value of excursions. The values that were mentioned above will be realized in actual practice only insofar as the teachers and school authorities practice such principles as are outlined in the following list.

1. Make a survey of the possible places to visit and build a program of excursions systematically instead of haphazardly.

2. Organize the program of excursions so that they fit into an orderly series with suitable variety, range, or progression, as regards what is seen.

3. Make previous arrangements with the authorities in the establishments visited so that the visits may be timed advantageously. For example, a plant may be partially idle on certain days and running full blast in all departments on others.

4. Be sure that the points visited are new to the students who go so that they offer genuine opportunities for education.

5. Choose the excursions carefully to correlate with the class study, either as the introduction to a topic or as a practical summary of it.

6. Arrange for flexibility in the schedule so that a group may be gone from school for as long as two hours at a time.

7. Avoid large-scale sight seeing in which so many pupils are

taken along that they get in each other's way and have trouble in seeing what they go for.

8. Provide plenty of guides so that the pupils can go thru in small groups and have processes explained to them.

9. Provide groups small enough so that each student can hear what the guide says when he is giving descriptions and explanations.

10. Plan carefully regarding the routine factors of transportation, expense, schedules, meeting places, etc., so that the values will not be lost thru mismanagement.

11. Provide competent leaders to take charge of the groups while going and returning.

12. Student leaders may be selected and coached by the teacher so that they can help keep the group together and can protect them against the risks of traffic, machinery, etc.

13. Maintain as good or better discipline on the trip as at school.

14. Prepare a card for each student containing printed cautions such as: (a) Take notebook and pencil. (b) Keep hands off. (c) Let the guide go first. (d) Let the teacher go last. (e) Listen to what the guide says. (f) Ask sensible questions. (g) Thank the guide when you leave. Etc.

15. Work out a definite plan so that the administrative office can know at all times what trips are scheduled or in process.

16. Have each parent sign a permission card authorizing the school to take his child on a trip.

17. Take great care to protect pupils from physical injury while on excursions. (This problem is so serious in some schools as to cause all excursions to be forbidden.)

18. Take every precaution to reduce expenses so that pupils of limited means will not be unduly taxed or forced to forego the benefits of the trip.

19. Take every precaution possible to save time or to crowd as much education into a trip as possible in a given amount of time.

20. Go thru the plant yourself before you take the pupils so that you can plan more carefully.

21. A class committee may be sent a few days beforehand to scout around the establishment and report to the group so that they can make plans for the visit.

22. Formulate definite aims for each trip and be sure that each student is clearly conscious of those aims.

23. Motivate the excursion by previous study, assignments, or class discussions.

24. Make certain that the students understand or interpret what they see instead of coming back with mere sensations.

25. Follow each excursion by further study and discussion of what was observed.

26. Utilize the trips to and from the establishment for directed sight seeing.

A SIXTH GRADE MOVIE PROJECT ON THE STUDY OF TIN

VIRGINIA WILLCUTS
State Teachers College, Duluth, Minnesota

After studying tin and finding out so many interesting facts about it, the sixth grade pupils decided that they would like to present these facts in the form of a movie to the fifth grade. They went about their planning eagerly. They first decided upon the topics to be used for their lectures and then selected the illustrations. This meant consulting many books and pictures.

Each child had a topic on which to write. Two or three pupils were assigned the planning and painting of each illustration. All thru the work the teacher was on hand only to direct the pupils in their planning and discussions. The following are lectures which the different pupils gave. As they gave these, they stood by their miniature stage and explained the pictures that were brought before their audience, one at a time.

First Pupil. Our grade has been studying tin. We found it very interesting. When we first became interested in it we were studying England. We talked about Cornwall where very much tin used to be found. Tin is one of the world's most important metals.

Second Pupil. (Child locates places on large world map.) Tin is found in Alaska, Mexico, Bolivia, Cornwall, Brittany, Saxony, Czechoslovakia, Spain, Belgium, Congo, Transvaal, India, Malaya, Banka, Billiton, Yunnan, Australia, and Tasmania.

Third Pupil. When tin ore comes from the earth, it is either dark brown or black. It is generally found in the form of crystals. The crystals are very brilliant with a luster like that of a diamond. When the impurities are removed from the tin ore, the tin is a silvery white. It may be hammered to a very thin sheet known as tin foil. It grows brittle at a temperature of 200° and melts at 280°. Pure tin resists rust.

Fourth Pupil. Articles which we call tin are not made entirely of tin. The tinned articles which we purchase, such as the tinned cup, the tinned spoon, and the tinned plate, are very inexpensive, but the tin itself is an expensive mineral.

In Bolivia tin is mined in the mountains. When it is taken from the ground it has many impurities in it which must be removed. It is sent to England, to Germany, or the United States, where it is refined because Bolivia has not much modern machinery. Before it is sent to other countries it must be sent to some seaport. Some tin is sent to the western coast of South America, then thru the Panama Canal, to England, or Germany, or the United States. Some tin is sent to Buenos Aires and then to the places just named. The short trip down the mountains costs much more than the long trip by water to other countries.

There is very little tin mined in the world. This makes that which is mined expensive. Some grades of tin ore contain only about 20 per cent of pure tin. In some other grades the percentage is considerably higher.

Fifth Pupil. When two or more metals are put together, the mixture is called an alloy. Some alloys containing tin are, tin and mercury used for mirrors, bronze, gun-metal, brass, Brittania metal, pewter, and solder. These alloys are used in making many different things. Some of these are, swords, ship-chains, axles for railroad cars and locomotives, steam whistles, bowls, telephone and telegraph wires, mechanical instruments, and many different kinds of bells.

Sixth Pupil. There are a great many uses made of tin. Tin foil is tin which is pounded very thin. It can be pounded to one-thousandth of an inch. Tin foil is used for gum wrappers, tobacco wrappers, candy wrappers, and other things. The common tinned can is not all tin, but a thin sheet of steel with a coating of tin. This is called tin plate. Since tin does not rust, food companies use containers made of tin plate. Some other things that are coated

with tin are, cheap jewelry, common pins, tinned pans, tinned spoons and many other things.

Seventh Pupil. Authentic records show us that tin has been mined in Cornwall since 500 B.C., when Phoenician galleys came bartering cheap trinkets for cargoes of tin. The amount of tin mined in Cornwall increased steadily until the end of the nineteenth century, since when it has decreased astoundingly. Many miners have been forced to move elsewhere in search of work. Many of these have come to work in the copper mines of Michigan. Indeed as one drives thru Cornwall deserted mines and villages are common sights. Of course some mines are still operating, but on the whole, Cornwall's glory has departed.

Eighth Pupil. Cornwall is in the southwestern part of England. Great quantities of tin have been found there. The mines in Cornwall are underground. When in the mines near the coast, the men can hear the surf beating above them. The depths of these mines vary greatly, from a few feet below sea-level to two thousand feet. It used to take the miners about an hour to get down into the deep mines. It was a very long and tiresome journey. Finally a miner who had been pondering over this matter, invented an apparatus which could carry the miners up and down in a much quicker and a much easier manner.

The Cornish men have always proved to be brave miners and capable business managers of the mining and refining of tin. Many Cornish men have made their fortunes by discovering and developing tin mines in Cornwall.

Ninth Pupil. Tin is found in the Malaya States and in Banka and Billiton, two large Islands south of Malaya. The tin which is in Malaya is found in the river beds and in open pit mines.

Tenth Pupil. The workers of Malaya are mostly women and girls. They work in the tin mines sitting on their heels. The coolies help, carrying the ore in baskets from the mines to have the impurities taken out of it.

The girls gather tin from the rivers. This process is called panning tin.

Eleventh Pupil. Hydraulic mining is used in Malaya. The alluvial deposits are broken up by water brought from the hills or mountains in long pipes and thrown in jets from great nozzles. The water is also made to wash the loosened material into long troughs or sluices where the tin ore is separated from the clay,

sand, and stones. Then it is sent by railroad to a smelter. Chinese coolies do the work.

Twelfth Pupil. Malaya has long been the chief source of the world's supply of tin. Most of the tin the United States gets, comes from Malaya. Banka and Billiton produce about 15 per cent of the world's tin. Malaya is producing more and more tin each year.

Thirteenth Pupil. Most of the tin mines of Bolivia are very high up in the Andes Mountains. Some of these mines are very large. Much tin is found. The workers in the mines are mostly Indians. The white men direct the Indians in their work. The natives, or Indians, who are used to the mountain air and work for low wages do the heavy work. They also help with the machinery.

The Indian women help by pounding and separating the tin. These women pound and pound and pound. They chew coca as they pound. This helps them to endure the cold, and to feel the pangs of hunger less. The coca is gathered from a shrub which contains cocaine. This shrub is very plentiful in Bolivia. Eating it gives the women a very pale look.

Fourteenth Pupil. In most of the mines a primitive way of mining is used. When the tin ore is taken from the mine the women pound it and make it into small pieces so the tin and other particles can be separated. Another way of separating the tin from the other materials is by putting the tin ore under a large boulder. A man on top of the boulder throws his weight from side to side, in that way crushing the ore, then the women sort it.

Fifteenth Pupil. The men and women are paid for the amount of tin they get so it is very hard to get them to stop working. A man traveling there wanted to get a picture of the women. He had a very hard time to get them to stop working long enough to have it taken. Most of the workers are very poor. Altho the men carry heavy loads, they get very little pay—about from one Boliviano to four per day. One Boliviano in American money is worth about thirty-nine cents.

Sixteenth Pupil. The beasts of burden used are donkeys, mules and llamas. Neither a donkey nor a mule can climb or breathe easily on the lofty passes, while the llama can. It can carry one hundred pounds. The llama is so cunning that if it is overloaded it will lie down and refuse to move until the burden is lessened. The llama is related to the camel.

Seventeenth Pupil. In early times there was very little mining

of tin in Bolivia. The extensive mining of tin started about 1895. In many of the mines tin and copper are found together. In early times the Incas saved the copper and threw away the tin. But now it is different. Both the tin and the copper are kept and they are used for many things.

Eighteenth Pupil. Bolivia is one of the few countries that is rich in tin. It ranks second in the world's production of this mineral. The production of tin in Bolivia in recent years has increased greatly, and it now furnishes about one-third of the world's supply. The output from Bolivian mines in 1925 was about 27,000 tons.

Nineteenth Pupil. Tin is a very useful mineral. It would be hard to do without it. Wherever we go we are likely to find some article made from this metal.

Such work is very valuable to the pupils. They are anxious to do their best in composition, fine art, and in public speaking so that their entertainment will be a success.

Sources

Williams. Romance of Mining

E. S. Dana. Minerals and How to Study Them

Encyclopædia Britannica

Paul Walle. Bolivia

Sir Martin Conway. The Bolivian Andes

The Evolution of a Tin Can. American Sheet and Tin Plate Company

Tin in 1927. Dept. of Commerce, Washington, D.C.

Bolivia as a Source of Tin. *Economic Geography,* July, 1927

Miller and Singewald. Mineral Deposits of South America

EDITORIAL NOTES AND NEWS

The Committee on Educational Relations of the National Council of Geography Teachers had its fifth sectional annual meeting in conjunction with the N.E.A. convention held at Columbus, Ohio, on July 2. "Some Next Steps in Geographic Education" was the theme of the meeting. The elementary phase of the theme was discussed by Dr. Edwin H. Reeder, Teachers College, New York City, and Dr. Douglas C. Ridgley, Clark University; that of secondary schools by Alice Foster, School of Education, University of Chicago. J. Russell Smith, Columbia University, and Erna Grassmuck, State Teachers College, Indiana, Pennsylvania, discussed the preparation of teachers for these progressive moves. These addresses will not be published in the N.E.A. proceedings. Those desiring to read copies of any of them may borrow a copy from the chairman of the committee, Erna Grassmuck, Indiana, Pennsylvania.

The first of these affiliated meetings was held in Philadelphia in 1926. Interest in these meetings is growing. The next meeting in connection with N.E.A. will be held in Denver. The committee in charge of the meeting will welcome suggestions for the program.

The Geographic Section of the Bureau of Foreign Commerce has prepared the following bulletins: Special Circular No. 26, Rules for the Spelling of Foreign Geographical Names for Official Use in the United States of America; Special Circular No. 31, Foreign Geographical Names, Official and Former Spelling.

The latter is a preliminary list containing some of the more commonly used names. Other lists in special circulars will be forthcoming and will be embodied in one comprehensive list. These circulars may be secured from the above mentioned section of the Department of Commerce, Washington, D.C.

Hills Brothers Company (packers of dates), 110 Washington Street, New York City, have an interesting illustrative pamphlet entitled, "With Jerry Arnold in Arabia." They will send it free to teachers.

According to the Bureau of Soils and Chemistry, U. S. Department of Agriculture, something like 17,500,000 acres of land that were formerly cultivated in this country have been destroyed by gullying, or so severely washed, that farmers cannot afford to attempt their cultivation or reclamation. What are you doing to awaken interest to help check erosion in your community?

Dr. C. B. Fawcett of the University College, University of London, will be Visiting Professor in Geography at Clark University during the fall semester of 1930-31. He will offer special work on the Political Geography of the British Empire, and another series of lectures on Geography of Continental Europe. Dr. Fawcett will be present and contribute to the national meetings of geographers to be held at Clark University next winter.

A herd of thirty musk oxen from Greenland is to be transferred to Fairbanks, Alaska. There they are to live in an enclosure where they will be cared for by men acquainted with the problems of feeding and breeding animals in captivity under Alaskan conditions. The experiment is being sponsored by the Bureau of Biological Survey of the United States Department of Agriculture. If the experiment proves successful, the musk oxen will be introduced on the treeless plains of northern Alaska where the musk oxen once roamed before their extermination by ruthless hunters and explorers.

The natural forage and cultivated foods consumed by these animals differs from that utilized by reindeer. Hence their domestication in Alaska would add another meat-producing animal well adapted to Arctic weather and vegetation.

New teachers of geography may be interested to know that for thirty-five cents you may secure a year's subscription to the *Geographic News Bulletins*, published by the National Geographic Society, Washington, D.C. The subscription includes 30 issues each consisting of five illustrated bulletins containing geographic news.

Preliminary work was recently started on the new transandine tunnel at Las Raices. This tunnel, three and one-half miles in length, will be the longest in South America. It is a part of the new transandine route via the Lonquimay Valley connecting Chile and Argentina.

By removing a hill, Morro do Costello, a building space of about twelve blocks was made available in the business section of Rio de Janeiro. Incidentally, sea breezes, formerly cut off by this hill, lowered the city's temperature 5.4° F. The waste rock removed was used as a fill at the entrance to the harbor, thus affording the city an additional area equivalent to about fifty city blocks. No haphazard erection will be allowed on this newly acquired land. Instead, the building program is in charge of a city planning director who plans to remodel a part of the old city so that the new and old will form an ensemble of most pleasing lines and be zoned so as to meet the various requirements of a great residential, industrial, and commercial center.

This year a three reel film depicting the fur industry of the United States was prepared for use at the International Fur Exposition at Leipzig. Teachers may borrow this film from the Office of Motion Pictures, United States Department of Agriculture, Washington, D.C. There is no rental fee, only transportation charges from Washington and return.

GEOGRAPHICAL PUBLICATIONS

Eugene Van Cleef. **Finland: The Republic Farthest North.** The Response of Finnish Life to its Geographic Environment. 209 pp. 17 photos, 12 maps, 16 grafs. Ohio State University Press, Columbus. 1929. $2.50

From his earlier studies of the Finns in America the author was led to investigate their former homeland in order "to apply the geographic principles and environmental influences (of Ratzel and Semple) to the development of a single group of people from a primitive unorganized state into a modern political entity." With this purpose he studies not merely the economic activities of Finland, including "Cooperation," but also its literature, music and art, history and politics (but apparently not religion), and concludes at the end, "the physical environment has been the prime factor shaping the activities of the Finnish people both in their native land and in the United States." In spite of his expressed desire to be cautious he finds "warm color combinations of reds and yellows in the weaves (of Finnish rugs) of the southwest coastal region" compared with "the colder blues and yellows of the interior," and a full paragraph is devoted to the relation of the prize plan of the Finnish architecture for the Chicago Tribune Building (a modern steel skyscraper) and the "granite and other igneous rocks of Finland!" Less questionable relationships are carefully labelled as "neat illustrations of man's adjustment to nature's offerings."

In places the author is diverted from his main theme by his too obvious desire to impress the reader with the splendid character and achievements of the Finnish people, and by his interest in the future of their country, which causes him to offer advice to their farmers. Various popular economic concepts are accepted as axiomatic, such as the advantage of inland waterways over railroads for bulky commodities, and the value, even for so small a country as Finland, of a protective tariff. The error, common to geographers, of ignoring relative location as an environmental factor, is reflected in the failure to understand that "the language conflict," far from being an anomaly "in a region of physical unity" reflects the characteristic disunity of coastal and interior districts. A similar error is made in calling the Gulf of Bothnia a "natural boundary" of Finland.

The book will provide for many American readers their easiest means of learning a little about the land, people, industries and culture of Finland, from a geographers point of view. This would have been more successfully accomplished if it had been made the main purpose of the book and at the same time the author might have more nearly attained his other objectives. One wishes that the single page devoted to natural landscapes had been greatly expanded and illustrated with many more photographs, and that the reader might not have been left in ignorance of the location, in Finland, of the views shown.

University of Minnesota Richard Hartshorne

Van Hise and Havemeyer. **Conservation of Our Natural Resources.** 567 pp. 93 figs., mostly photos and maps. The Macmillan Co., New York, 1930

This purports to be a new edition of Chas R. Van Hise's very favorably known and much used book, The Conservation of Natural Resources in the United States, published in 1910, and reprinted many times thereafter. The present book is, however,

almost entirely new, except for its title and the titles of its chief parts, and the two appendices, which are reprinted. Loomis Havemeyer, Assistant Professor of Anthropology at Yale University, is the editor, rather than the author of this book, as he wrote only some 30 pages (introduction and concluding chapter). Most of the book is by five other men, experts in their fields. Editor G. A. Roush of *Mineral Industry* has contributed the part on the Mineral Resources (100 pages), F. H. Newell, former Director of the U. S. Reclamation Service, discusses the Conservation of Water, in its various aspects (110 pp.). Dean H. S. Graves of the Yale Forestry School, and former Chief of the U. S. Forest Service, writes on Forests (90 pp.). The Land is discussed by G. S. Wehrwein, Professor of Economics, College of Agriculture, University of Wisconsin (74 pp.). The Conservation of Wild Life is discussed by the Chief of the U.S. Biological Survey, P. G. Redington, with a section on fish by E. Higgins of the Bureau of Fisheries (110 pp.). The Conservation of Wild Life was not discussed by Van Hise.

Van Hise wrote his book with much fervor, and at innumerable points he stressed the urgent need for conservation. The authors of the present book have, instead, nowhere become at all excited about the situation. Indeed they leave the impression that there is little or nothing to become excited about. The changed joint of view reflects a greatly reduced estimate of the probable future population. Van Hise considered that the United States would in the future have to supply 500,000,000 or a billion people with most of their needs. Because of the striking fall in the birth rate, the present authors apparently consider that the population will become nearly stationary at about 200,000,000 or even less. Technical advances have greatly increased the supplies of resources available. Ores which were of too low a grade in 1910 to have any value may now, with the help of the ore flotation method, be exploited; land which was marginal in 1910 because of erratic rainfall or short frost-free season, similarly may now, with the help of tractors and other labor-saving devices, be farmed, and in favorable years yield heavily.

The far greater optimism of the new book extends even to the discussion of soil erosion. As there appears to be an abundance of better land to provide for the needs of the future maximum population, extensive efforts to reduce soil erosion are unwise! Likewise additional irrigation and drainage are declared undesirable. Indeed it appears wise to allow numerous tracts now reclaimed to revert. Furthermore the great technical increase in the efficiency of steam plants has made them more efficient now than most hydroelectric plants!

The more recent data on the production of natural resources, the revised viewpoint as to the sorts of conservation most needed, and the new section on the conservation of wild life make this book a valuable addition to a school library.

Indiana University S. S. VISHER

R. H. Whitbeck and V. C. Finch. **Economic Geography.** 565 pp., 331 illustrations, 12 statistical tables. Second edition. McGraw-Hill Book Company, New York, 1930

The revised text which is presented as a second edition is one of minor changes and refinements rather than any marked shift from the general plan of the earlier book. Statistical material has been brought more nearly up to date, illustrations have been brought into line with the later data and only slight changes have been made in the text discussions. That so few changes have been deemed necessary is evidence that the book has proven quite satisfactory to a substantial clientele.

The general plan can be reviewed but briefly now. Aside from a short introductory chapter the first half of the book, 262 pages, deals with the United States and

Canada chiefly from the standpoint of commodity studies. The whole picture of agriculture, forest utilization, animal industries, mineral and power resources, land and water transportation, foreign trade, the United States in the Pacific, and a summary of Canada is passed in review with almost breath taking swiftness. The second part of the book, about 300 pages, deals with the world outside of the United States and Canada, using individual countries or groups of countries as the units of study. These begin with Mexico and the Caribbean lands and proceed thru South America, thence to Europe, followed by selected portions of Asia and resumes of Africa, Australia and New Zealand.

In the hands of less skillful writers the method followed would be in danger of leading to disconnected articles, encyclopedic in nature and failing to make any definite progress scholastically. Notwithstanding the authors' disavowal at the outset of any attempt to present physiography or climate, they bring in the relationships of natural environment to production and to distribution in commendable manner. Altho the book is praiseworthy because of its presentation of salient geographic facts and for the careful statements based on the facts, the largest contribution lies in its clear exposition of geographic relationships. Furthermore, admission is made repeatedly that the geographic setting represents only part of the story and often must be illuminated by the economic, social and political factors ere present situations can be fully understood. This is done effectively without in any sense subordinating the importance of the geographic factors in industrial and economic achievement. In the judgment of the reviewer, therein lies the unique strength in Whitbeck and Finch's Economic Geography, a volume in which we may all take pride as a worthy member of the rapidly growing family of textbooks in college geography.

University of Nebraska NELS A. BENGTSON

Harold Rugg. **Changing Civilizations in the Modern World.** 633 pp. 255 photos, maps, grafs, and diagrams. Pupil's Workbook and Teacher's Guide to accompany text. Ginn and Company, Boston. 1930. $1.96

This is the second of the "reading" books of the Rugg series in the social studies. In the sub-title this book is called "a textbook in world geography with historical backgrounds." The author states, in the preface, that "historical, geographic, economic, and other materials are studied in close relationship. . . . . If geographic relationships are needed to throw light upon contemporary problems, those geographic relationships are incorporated." It is claimed that the organization used, projected thru the whole series, has resulted in a sharp increase in the amount of geography and history in the curriculum. The extensive research and experimentation preliminary to the publication of the material in the present form is emphasized, as if it were a guarantee of the quality of the product.

The book is organized in twelve units, each made up of one or more chapters. The first unit, a single chapter, is introductory in character, and raises the problem of world distribution of population and human activities grafically thru the use of a population map. The succeeding units deal with the more important national states of the world, largely thru the medium of interestingly written descriptive historical material, supplemented by many statistics showing striking comparisons and trends. This material, in part chronologically organized for each unit, is occasionally supplemented by the so-called "dramatic episode," merely a dialogue or quotation giving a higher degree of reality to the point being made. The style of writing is simple and direct. However, at times it appears, in dealing with geographical facts, that the vocabulary

has been reduced to the level of the students for whom the book is meant thru a conscious effort, which has resulted in lessened accuracy and definiteness in expression.

From the standpoint of geography the book is a distinct disappointment. It is apparent that no one connected with the writing of the book has had any recent scientific training in geography. The mere inclusion of locational and other facts which have some geographic flavor, with no interpretation of such facts thru an understanding of concrete environmental conditions to which they may be related, is not geography. Any worthwhile quantity of intelligent geographic thinking, that is, the development of understandings regarding human activities thru a knowledge of the environmental complexes to which such activities are related is impossible, since nowhere in the book is any provision made for the development of an adequate knowledge of environmental elements. "Weather" and "climate" are used without discrimination, from which it is obvious that the author is unaware of the scientific meaning of the terms. The "lay of the land" is mentioned as well, but there is nothing in the text or the workbook to insure any concrete understanding of land forms. The few other environmental elements mentioned are handled no more satisfactorily. Commonly where the word "geography" appears, it is in quotation marks, apparently to emphasize its presence.

Either thru a lack of geographic knowledge, or thru carelessness, inaccuracies are inexcusably common. In speaking of "tropical jungles" the statement is made that "rain falls unceasingly for weeks." The Lorraine iron deposits are referred to as "one of the best iron fields in the world." It is well known that these ores are low grade and difficult to reduce. The field is one of the more important sources of iron in the world, but the adjective "best" is false. It is stated that "Germany raises more rye than any other European country. . . ." In Germany's best recent year (1928) Russian production was double that of Germany. The following question is asked, "Is there any relation between the large amount of rainfall in southern Russia and the great production of wheat, rye, barley, and other crops?" The average annual precipitation in this area is between 10 and 20 inches, and the section is classified as semi-arid. The marked exception is the Rion valley, south of the Caucasus Mountains, where maize is the principal cereal crop.

In a later unit dealing with South America, the following statement appears, "Buenos Aires . . . . has a climate very similar to that of Los Angeles." The fact that in one case the rainfall maximum occurs in summer and in the other in the winter, with very different totals, escaped the notice of the author. In the chapter dealing with Brazil the statement is made that "Brazil supplies one-fifth of the world's raw rubber." In 1926, the most recent year for which data not in part based upon estimates are easily available, Brazil produced slightly less than 4 per cent of the world supply. These are some of the many glaring inaccuracies.

Even more serious than the inaccuracies, from the point of view of geography, are the omissions. Asia is treated without any consideration of the monsoon winds, and many other correspondingly important items are just mentioned or completely ignored. Time after time the context gives opportunity for the introduction of real geographic thinking, based upon an understanding of the relationships between the human activities and the environmental complex in which they occur. But the surface is merely scratched and nothing is made of the opportunity. As an example, the climate of France is lumped together as a whole, with no differentiation between Brittany and the Riviera. This quality in the book, encouraging the development of careless, shallow reasoning, based upon a very meager understanding of the elements of the situation is most serious from the educational standpoint. The situation is particularly discouraging when the student is unaware that he is reasoning from insufficient data, as is apparently the case of the author. Such a condition can only arise when one attempts to work entirely outside his own field of educational endeavor.

Space does not permit a detailed consideration of the use of pictures, grafs, and maps in the book. The maps are in general on too small a scale to be very usable. The map of the iron ore resources of the world (p. 98) is particularly poor and inaccurate. The use of Goode's Homolosine Projection in the workbook is the one bright spot in the selection of maps. The author again is unaware that special techniques have been developed covering the use of pictures, grafs, and maps in the field of geography, so making such materials serve to make more concrete the environmental background of human activities. Aside from the inaccuracies, the geography in this text merits the description, "Perfectly true, perfectly general, perfectly meaningless."

The futility of the whole social studies concept in its present stage of development is demonstrated by this book. While this book may adhere in every detail to modern educational theory as understood by the author, it still appears that special content requires special knowledge and special methods of presentation. Modern geography cannot be adequately taught without the special techniques which are the result of the nature of the content. Therefore, if a propagandist for the social studies is to gain the fundamental relationship values which geography contributes to the combination, a modern functioning geography with an adequate basis of environmental knowledge is absolutely essential.

If, as the author claims, the quantity of geography in the curriculum is increased thru the social studies organization, it is unfortunate that such geography is not of high quality, rather than a superficial travesty on the philosophy and content of the subject.

Northern State Teachers College L. H. HALVERSON
Marquette, Michigan

E. V. Cowdry, Editor. **Human Biology and Racial Welfare.** 630 pp. Paul B. Hoeber, Inc. New York City. 1930. $6.00.

The twenty-eight authors of this work are prominent scientists and their chapters form valuable summaries of the subjects discussed. Many of the discussions can be read with enjoyment by alert high school pupils. Teachers will find much of deep interest in this book, because of the authoritative character of the statements, their up-to-dateness, and because extensive knowledge of the subjects discussed is not presupposed by the authors.

The Effects of the Environment (200 pages) has especial value for those interested in geography. Ellsworth Huntington's discussion of the effect of climate and weather is a good 35 page summary. E. V. McCollum, in "The reaction to Food," 18 pp., presents much which is often inadequately considered by geographers. "The Influence of Urban and Rural Environment" by Emerson and Phelps is a 30 page chapter which will be of great service to many teachers of geography. Other chapters in this environmental part are by Healy, on antisocial behavior; by Zinzer, on adjustment to infectious disease, and by John Dewey, on the Influence of Education. Chapter I, on Life in Space and Time, by H. N. Russell, discusses quite satisfactorily environmental conditions in the other planets and elsewhere in the universe, from the standpoint of life, and will interest many geographers. The origin of man is discussed from various angles by I. B. MacCallum, W. K. Gregory, G. H. Parker, R. M. Yerkes, W. M. Wheeler, and A. Hrdlicka. Chapters on the Human Population by Raymond Pearl, and on the Mingling of Races by C. B. Davenport will also interest many teachers of geography.

Indiana University S. S. VISHER

C. C. Crawford and L. P. McDonald. **Modern Methods in Teaching Geography.** Houghton, Mifflin Co., N.Y. 1929

This volume is intended to serve as a text in teacher training courses. The preface states that the material for the master's thesis on which the book is based was assembled in interviews with geography teachers. No data are given to substantiate these teachers' qualifications for offering such research data. Compilations of the opinions and practices of teachers, regardless of the amount and quality of their training in geographic education, are not necessarily criteria for geographic learning. The book properly displays enthusiasm for "activity" procedure. A host of *devices* for teaching geography are given that will attract teachers. But no definite and distinctive *techniques* for learning geography are given.

In the statement of General Aims, the authors show some vision of what geography has to offer, but they do not show how to achieve these goals in terms of progressive geographic education. Thruout the book the lack of a grasp of modern geographic education is apparent. The book indicates a breadth of knowledge of certain phases of modern psychology and general education, as for example, Chapters V, VII, X, XIV. But evidence of real geographic knowledge is lacking.

No significant core themes are suggested. What trained teacher would consider using as a first question in the study of India "Why do mothers consider it a noble deed to throw their babies into the Ganges?" This practice is so local that it should not be associated with the elementary school pupil's concept of India. Also, it is a dangerous as well as an insignificant idea to be given such emphasis. No major geographic understandings can be the outcomes from such lessons.

The chapter on Visual Education gives *tricks* for factual learning. It presents no underlying principles for acquiring skill in observing *geographic* data. So also suggestions appear for observing isolated social and natural items on a journey, but none for discovering geographic *relationships.* The chapter of Journey Methods, and several other chapters are conclusive evidence that the "viewpoint of the classroom teacher of geography, that of the research worker, that of a university professor of education" are not sufficient to produce a functioning and scientific discussion of modern methods in teaching geography.

The test exercises appearing at the end of each chapter are true-false type. They will stimulate some thought. Too frequently they deal with glittering generalities which no careful student should be required to classify as true or false.

Since this book deals primarily with *devices* rather than *techniques,* and definitely shows an insufficient grasp of modern geography, its contribution to the preparation of teachers of geography either in training or in service is negligible.

ERNA GRASSMUCK

State Teachers College,
Indiana, Pennsylvania